

**Installation of Metric Signal Cable #700319-01
in Cable Tray at the PHENIX Experiment**

Summary

The Laboratory Electrical Safety Committee approved the PHENIX Experiment request to use a non-tray rated signal cable for a future detector known as the HBD. The signal cable is approximately 1/16 inch diameter and will be bundled in groups of sixteen, wrapped in a protective oversleeve. The cable is Meritic #700319-01, 100 ohm Shielded Parallel Pair, 28/30 AWG Stranded Copper, a) White b) Blue Foam Poly Insulation, PVC Jacket, Aluminum/Polyester Tape Shield, with a Time Delay ns/ft 1.35. It will be run in cable tray from the detector to its associated electronics rack. The oversleeve is a very tough FR polyester-nylon polymer material that is resistant to chafing, cutting, and abrading. Both the cable and oversleeve flammability classifications have been reviewed and approved by Joe Levesque for use at PHENIX.

Discussion

Per the Design Engineer there is no tray rated equivalent cable that meets the electrical specifications to be matched with the electronic pre-amps (see attached spec sheet). The Experimental Safety Review Committee for C-AD requires Electrical Safety Committee approval prior to their approval.

The National Electrical Code Article 392.3 states “Cable tray shall be permitted to be used as a support system for service conductors, feeders, branch circuits, communications circuits, control circuits, and signaling circuits.” The NEC in Table 392.3(A), lists the permitted wiring methods for cable tray and also permits wiring methods specifically approved “Other factory-assembled, multiconductor control, signal, or power cables that are specifically approved for installation in cable trays.”

The cable and the Self-fitting Protective Oversleeve passed the UL 1441 flammability Test value VW-1 which is an acceptable test for fire properties at BNL per the Fire Protection Engineer (see attached copy of Email)

NFPA 70 Equivalency – Laboratory Electrical Safety Committee – Jan 2006

From: Levesque, Joseph W
Sent: Thursday, November 03, 2005 6:49 AM
To: Giannotti, Paul
Subject: RE: FlameTest

[VW-1 is an acceptable test for fire properties at BNL for general cable use.](#)

[The issue on whether it is acceptable for Tray Cable needs to go to the Electrical Safety Committee](#)

-----Original Message-----

From: Giannotti, Paul
Sent: Wednesday, November 02, 2005 12:14 PM
To: Levesque, Joseph W
Subject: FlameTest

Hi Joe,

As per your request, I have acquired a sample of the HBD signal cable (Meritec/Expando) assembly that is proposed for use in the PHENIX Detector.

A few weeks ago, you had mentioned that since the signal cable data sheet indicated a flame classification of UL-94V-0.....and this was not an applicable flame spec. for use in cable tray by the NEC.....then you would like to perform a small scale flame test at the Fire House facility and approve this cable assembly for use contingent upon the test results (as you've done similarly, in the past, with our ToF high voltage coax cable manufactured by the Italian company CPE).

The Meritec data sheet I had provided for your review was from a Power Point slide presentation by a Nevis Lab engineer.

After closer study of this slide (erroneously titled: SIGNAL CABLE) I realized that the slide was actually a spec sheet for the multi-pin connector to be used with the cable. I apologize for the confusion.

I have reviewed the Meritec cable data sheet and it indicates a flame resistance of VW-1.

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Meritec Cable & Wire Specifications

Part Number 700319-01 **Revision B** **Revision Date:** 10/31/2005 **Revision By:** JFS

Outline Drawing

Material Thickness OD

Description Type: twinax; Char. Impedance: 100. +/- 10. ohms;

Wire Gauge: 28; Dielectric Material: foamed

polyolefin

Type twinax

Bundled MIL Spec

UL Subject UL Style AWM 2854 **CSA Type**

Temperature Rating -40. to +80. deg.C **Flame Resistance** VW-1

Characteristic Impedance 100. +/- 10. ohms **Propagation Delay** 1.35 +/- . nsec/ft

Velocity of Propagation 75 .3 %(nom.) **Capacitance**

Within-Pair Skew 5. psec/ft max **DC Resistance** 66 .5 ohms/1000ft @20 oC

Attenuation at 100MHz

Attenuation at 1GHz

Dielectric Withstand Voltage

Wire Gauge 28 **Wire Plating** TPC

Wire Stranding 7/36 **Wire OD** 0.015 in.

Wire Lay

Dielectric Material foamed polyolefin

Dielectric OD .039+/- .002 in.

Dielectric Color white and blue

Material alum/poly tape(al in) **Coverage** 100 % **OD**

Material PVC Thickness .005 in. **OD** .055 +/- .003 X .091 +/- .003 in.

Color deck grey

Marking Meritec P/N 700319-01

Lot # xxxx

WWW.MERITEC.COM

Bundle Configuration Cable Bend Radius

Material Coverage

Pair-to-Pair Skew 9.4 psec/ft max

Notes shield has 20% min. overlap

Jacket temperature rating is 105 deg.C

1st Shield:

2nd Shield:

2nd Jacket:

1st Jacket:

Color

Braid Gauge

OD Braid Gauge

Drain Wire Gauge 30

Drain Wire Stranding 7/38 **Drain Wire OD** 0.012 in.

Drain Wire Plating TPC